

WHAT IS CLAIMED IS:

1. A high-frequency semiconductor device comprising:
a ceramic substrate;
5 an element group including semiconductor elements and passive components mounted onto a bottom portion of the ceramic substrate; and
a composite resin material layer formed on the bottom portion of the ceramic substrate so as to bury the element group;
wherein the composite resin material layer is formed by a composite
10 resin material including an epoxy resin and an inorganic filler material, and the composite resin material layer has a flat bottom surface on which electrodes for connecting to the outside are formed.
2. The high-frequency semiconductor device according to claim 1,
15 wherein the semiconductor elements are mounted by flip-chip connection.
3. The high-frequency semiconductor device according to claim 2,
wherein interlayer connector structures are formed in the composite resin material layer, the interlayer connector structures being filled with a high
20 thermal conductivity resin material having thermal conductivity higher than that of the epoxy resin, the electrodes for connecting to the outside include a ground electrode that functions as a heat release electrode, and a surface of the semiconductor elements is connected to the ground electrode via the interlayer connector structures.
- 25 4. A high-frequency semiconductor device comprising:
a first ceramic substrate having a circuit pattern;
a second ceramic substrate on which semiconductor elements are mounted; and
30 a composite resin material layer that buries the semiconductor elements and is provided between the first ceramic substrate and the second ceramic substrate;
wherein the composite resin material layer is formed by a composite resin material including an epoxy resin and an inorganic filler material,
35 interlayer connector structures in which a conducting resin material has been filled are formed in the composite resin material layer, and the circuit pattern of the first ceramic substrate and a circuit pattern of the second ceramic

substrate are electrically connected via the interlayer connector structures.

5. The high-frequency semiconductor device according to claim 4,
wherein the semiconductor elements provided on the second ceramic
5 substrate are mounted by flip-chip connection.

6. The high-frequency semiconductor device according to claim 5,
wherein at least one of the semiconductor elements provided on the second
ceramic substrate is connected by a metal wire.

10 7. The high-frequency semiconductor device according to claim 6,
wherein the surroundings of the semiconductor elements provided on the
second ceramic substrate and connected by the metal wire are sealed by a
liquid epoxy resin.

15 8. A high-frequency semiconductor element comprising:
a ceramic substrate having a cavity portion in its bottom portion;
an element group including semiconductor elements and passive
components mounted to the bottom portion of the cavity portion;
20 a composite resin material layer formed so as to bury the element
group in the cavity portion; and
electrodes for connecting to the outside that are formed on a bottom
portion of the ceramic substrate other than at the cavity portion;
wherein the composite resin material layer is formed by a composite
25 resin material including an epoxy resin and an inorganic filler material, and
a bottom portion of the composite resin material layer is flat in shape.